Coral Reef Watch

NOAA Coral Reef Watch uses satellite, modeled, and *in situ* data to provide current reef environmental conditions to quickly identify areas at risk for coral bleaching.

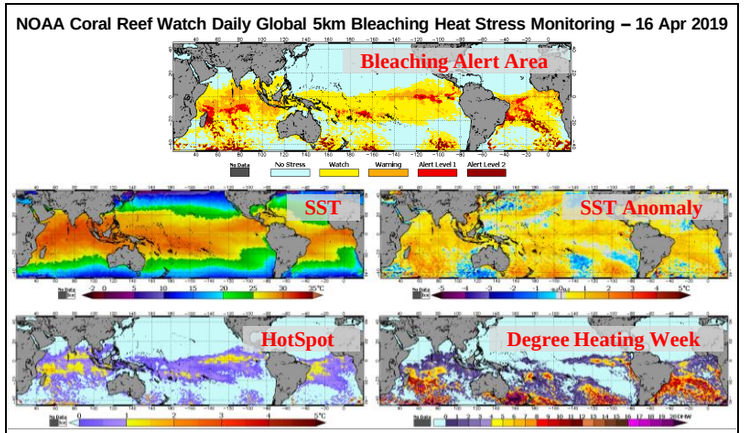
Coral reefs are one of the most biologically diverse ecosystems in the world. Reefs support essential coastal fisheries, protect coasts from erosion and storms, support local tourism, and are sources of pharmaceuticals.

Sustained high water temperatures, in conjunction with other natural and human-based threats, may cause coral bleaching to become an annual event in many areas. This could lead to a rapid decline in coral ecosystem health worldwide.

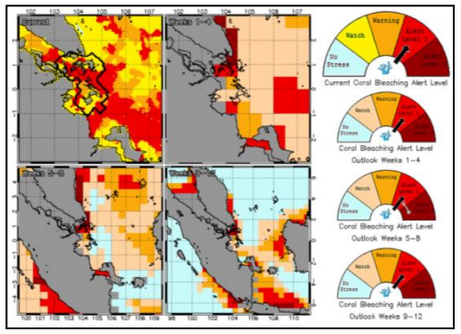
Coral Reef Watch is funded primarily by NOAA's Coral Reef Conservation Program and housed in the National Environmental Satellite, Data, and Information Service's Center for Satellite Applications and Research.

NOAA CORAL REEF CONSERVATION PROGRAM

NESDIS National Environmental Satellite, Data and Information Service



High-Resolution Monitoring: Coral Reef Watch's Daily Global (above) and Regional (below) 5km Satellite Coral Bleaching Heat Stress products (released Aug 2018) are derived from its 'CoralTemp' sea surface temperature (SST) product. Spanning 1985-present, the 'CoralTemp' SST was developed from multiple, daily blended Geostationary and Polar satellite SST products. Our most user-requested upgrade, the 5km products provide information at or near the reef scale and significantly reduce data gaps from cloud cover. These products alert coral reef stakeholders to environmental changes and potential threats to their reefs, helping facilitate effective management actions and communication to prepare for and response to mass bleaching.



Example 5km Regional Virtual Station (Singapore Strait) on the daily 5km Bleaching Alert Area map for Jun 13, 2016, when Alert Level 1 heat stress (associated with significant coral bleaching) was reached. Gauges (right of map) show the Station's heat stress level on Jun 13 (top) and predicted levels for 1-4, 5-8, and 9-12 weeks' out (bottom gauges).

Latest global data and images freely available at:

https://coralreefwatch.noaa.gov

For more information, contact us at:

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Apr 2019

NOAA CORAL REEF WATCH

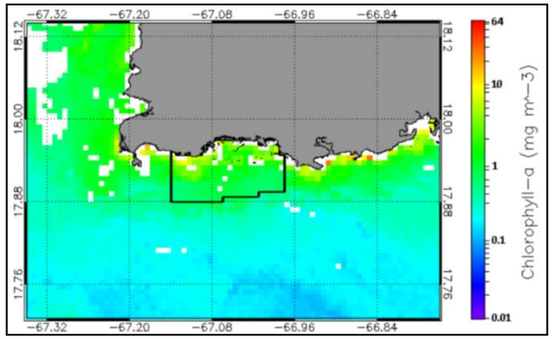
NOAA Coral Reef Watch

Satellite Monitoring and Modeled Outlooks for Coral Reefs

Coral Reefs and Climate Change

Elevated ocean temperatures and periods of high sunlight cause corals to expel symbiotic algae living in their tissues that provide most of their energy and color. While corals can recover from brief, minor heat stress, they can starve and die if the stress continues for weeks or months. Coral Reef Watch operates a world benchmark decision support system of near-real-time monitoring and prediction tools, based on satellite, modeled, and *in situ* data, to inform and alert managers and researchers to environmental stresses to coral reef ecosystems. Historical satellite data are also used to investigate and provide information on long-term changes in coral reef environmental stresses.

Ocean Color for Coral Reefs



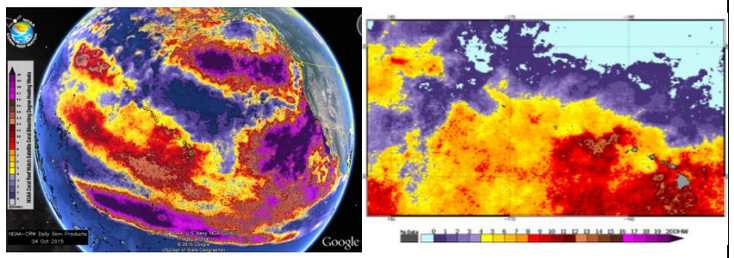
Daily 750m Chlorophyll-a, La Parguera, Puerto Rico (Virtual Area, black outline), Sep 10, 2018

Working with U.S. Coral Reef Task Force partners, NOAA's Ocean Color Team and Coral Reef Watch are developing satellite ocean color products to help managers monitor variable water turbidity [diffuse attenuation coefficient at 490 nm, $K_d(490)(m^{-1})$] and chlorophyll-*a* affecting coral reef health, especially after large rain events or from industrial or residential discharges. Near real-time products have been developed for Puerto Rico and West Maui, Hawaii from science-quality Visible Infrared Imaging Radiometer Suite (VIIRS) 750m satellite imagery. Product validation with in-water optical measurements and spatial resolution enhancement are underway.

Coral Reef Conservation & Satellite Technology

NOAA Coral Reef Watch uses sea surface temperature (SST) and other data measured by polar-orbiting and geostationary environmental satellites to keep a constant, vigilant eye on changes in the environmental conditions of U.S. and global coral reef ecosystems.

Continuous monitoring of SST at global scales provides coral reef ecosystem stakeholders with tools to understand, monitor, and better manage the complex interactions leading to coral bleaching, disease, and overall coral health deterioration. When heat stress occurs, Coral Reef Watch products are used to trigger bleaching and disease response plans and to support appropriate, timely management decisions and effective communication. NOAA



Coral Reef Watch Data Formats

Product data are available in network Common Data Form (netCDF, 5km products), Hierarchical Data Format (HDF, 50km products), via Google Earth and Google Maps, and as ASCII text, graphs, and images.

Future Directions

Coral Reef Watch is working on a number of experimental products to enhance its decision support system for coral reef ecosystem management. These include Light Stress Damage, Coral Disease Outbreak Risk, Thermal History, and Larval Connectivity product suites, among others.

Four-Month Bleaching Outlook

In March 2018, NOAA Coral Reef Watch released its Version 5 (v5) Four-Month Coral Bleaching Heat Stress Outlook. Based on the NOAA National Centers for Environmental Prediction's latest Climate Forecast System Version 2 (CFSv2), the Outlook is produced at 50km spatial resolution and is updated every Tuesday. It uses a weekly ensemble of CFSv2 sea surface temperature forecasts to predict the likelihood of coral bleaching up to four months in the future. The Four-Month and corresponding weekly Outlooks are used by coral reef managers, scientists, and monitoring networks worldwide to prepare and prioritize resources for, effectively respond to, and communicate broadly about bleaching on local coral reefs.

Coral Reef Watch – 16 Apr 2019 – Four-Month Bleaching Heat Stress Outlook for Apr-Jul 2019